

ORNITHOLOGY.—Notes on the generic affiliations of the great grebe of South America. ALEXANDER WETMORE, Smithsonian Institution, and KENNETH C. PARKES, Carnegie Museum.

The great grebe found from southern Brazil and northern Chile (occasionally from the coast of Perú) to Tierra del Fuego was named *Colymbus major* by Boddaert in 1783. In 1862 Coues set up the genus *Aechmophorus* to include *Podiceps occidentalis* Lawrence, designated as the type of the new genus, and *Podiceps clarkii* Lawrence, the latter now known to be the female of *occidentalis*. The first authors to place Boddaert's species *major* in *Aechmophorus* appear to have been Sclater and Salvin (Nomenclator Avium Neotropicalium, 1873: 150), and it has been listed as *Aechmophorus major* in all the standard reference works on South American birds we have consulted, with the single exception of Brabourne and Chubb (Birds of South America, 1912: 27), who include *major* in *Podiceps*, with no reference to the genus *Aechmophorus*.

We propose to show (1) that the original generic diagnosis of *Aechmophorus* by Coues was inadequate and (2) that the species *major* belongs in the genus *Colymbus*, with *occidentalis* remaining as the only living member of *Aechmophorus*.

The principal characters invoked by Coues in his diagnosis involve the length and shape of the bill, shape of the outer primaries, and proportions of tarsus, middle toe, and outer toe. The form of the bill we regard as of little importance since the variation within the genus *Colymbus* as presently understood is already so great that the inclusion of the long-billed *major* is not unwarranted on this count. Bill-size in grebes in general is an allometric character; the larger the grebe, the longer, proportionally, is the bill. This is even noticeable within a species, e.g., compare *C. g. griseigena* with *C. g. holbölli*.

*Aechmophorus occidentalis* has the outermost primaries somewhat more sharply incised and more attenuated than any species of *Colymbus* (including *major*). This, however, is again a matter of degree, since there is much variation in this character among the species concerned.

Coues claimed that in *Aechmophorus* the outer lateral toe is "much longer than the middle," while in *Colymbus* the outer lateral toe is said to be "but little, if any, longer than the middle toe." This character does not hold true. The ratio of the outer to the middle toe measured and computed for four adult males each of *Aechmophorus occidentalis*, *Colymbus cristatus* (type species of the genus), and "*Aechmophorus*" *major* gives the following results:

<i>occidentalis</i> :	1.05, 1.07, 1.08, 1.09.
<i>cristatus</i> :	1.06, 1.06, 1.07, 1.09.
<i>major</i> :	1.04, 1.05, 1.05, 1.05.

It can easily be seen that *Aechmophorus* and *Colymbus* cannot be separated on this count and that the ratios for *major* average a little lower, away from the condition claimed for *Aechmophorus* by Coues.

Another character of proportion used by Coues involves the tarsus and the middle toe with claw. In *Aechmophorus* the tarsus is said to be as long as the middle toe and claw, while in *Colymbus* it is shorter. Using the same four specimens of each species as above, and computing the ratio between tarsus and middle toe with claw, the table below demonstrates that a separation can be made on this basis, but that *major* definitely falls with *Colymbus* rather than *Aechmophorus*:

<i>occidentalis</i> :	1.00, 1.04, 1.05, 1.07.
<i>cristatus</i> :	.91, .96, .97, .97.
<i>major</i> :	.92, .95, .97, .97.

Ogilvie-Grant (Cat. Birds Brit. Mus. 26, 1898: 502) includes still another character in his key to the genera of grebes. In his "*Podicipes*" the secondaries are said to be equal to or not much shorter than the primaries, while in *Aechmophorus* the secondaries are short, with the longest about equal to the ninth or tenth primary. This character holds good for *occidentalis* versus *cristatus*, and in this matter of wing shape *major* is closer to *occidentalis*. However, when the other species of *Colymbus* are examined, the character breaks down,

as some specimens of *Colymbus caspicus* and *C. occipitalis* would fall into *Aechmophorus* if classification were to be attempted on the basis of this comparison of primaries and secondaries.

In his diagnosis of the genus *Aechmophorus*, Ogilvie-Grant (op. cit.: 549) states that the nuptial and winter plumages are alike. This is not true of the great grebe, which has a pronounced seasonal color change, but may be accepted for *occidentalis*, though in that species the winter plumage is actually slightly duller than the breeding dress.

A character, however, which separates *Aechmophorus* from *Colymbus* is the following: In *Aechmophorus* the culmen is somewhat flattened between the nostrils, which open almost directly upward; in *Colymbus* the culmen is ridged, often markedly, between the nostrils, which open in a more lateral direction. We have verified this in all the species of the latter genus except *taczanowskii*, which from the plate that accompanies the original description, is like its relatives. In bill form, *major* is like the species of *Colymbus*.

Perhaps one of the most important pieces of evidence that *major* is a *Colymbus* rather than an *Aechmophorus* is the color of the downy young. Like all of the other species of *Colymbus*, the downy *major* has a streaked pattern, best developed on the head, but present also on neck and back. The juvenal plumage also has some streaks on the face. *Aechmophorus occidentalis*, on the other hand, shows no streaks in any plumage, the downy young being a uniform gray, completely unlike any other grebe.

When the senior author first met the great grebe in life in Argentina he was so impressed by its difference in appearance from the western grebe that he secured skeletal material that is available for the present studies. In the osteology an impressive character marking *Aechmophorus occidentalis* is in the form of the braincase, which is elongated so that the cavity for the brain is enlarged longitudinally, and the actual brain capacity appears considerably increased. In fact, the forward extension of the cavity for the brain reduces appreciably the size of the interorbital opening between the two eyes.

In *Colymbus cristatus*, type of *Colymbus*, on the contrary, the brain case is relatively shorter, and the interorbital opening larger in the area immediately adjacent to the anterior part of the brain. The posterior part of the cranium appears broader and more abruptly truncated, particularly when viewed from above. The eared grebe and horned grebe both agree with *cristatus*, indicating that this conformation is one that is characteristic of the genus. The five skulls of *major* available are like those of *Colymbus cristatus*, differing in the same manner as does *cristatus* from *Aechmophorus occidentalis*.

In life the great grebe bears a striking resemblance to the red-necked grebe (*Colymbus grisegena*) in general form, color pattern, and actions, differing from the longer and more slender necked western grebe as does our familiar American form, *Colymbus grisegena holbölli*. To one familiar with the western grebe the differences in form and color are clear cut and striking.

We have no hesitance in transferring *major* to the genus *Colymbus*, where in the arrangement of species followed by Peters (Check-list Birds of the World 1, 1931: 38-40) it should be placed at the end, following *grisegena*. It is our opinion, in conformity with this, that *Aechmophorus occidentalis* is the sole surviving species of its genus, a genus which, presumably, diverged early from the line that has produced *Colymbus*, since *Aechmophorus* seems in several ways more primitive than *Colymbus*, viz., in the plain plumage pattern of the downy young to which we have referred, also in the unspecialized color pattern of the adults, which resembles in general the immature and winter plumages of *Colymbus*.

Fossil remains of *Aechmophorus* from the Pleistocene of Fossil Lake, Oregon, have been described by L. H. Miller (Univ. Calif. Publ., Bull. Dept. Geol., 6, 1911: 83) as *A. lucasi*. These differ from the living birds mainly in large size of the leg bones, with body and wing dimensions the same as modern *occidentalis*. Hildegard Howard (Carnegie Inst. Washington Publ. 551, 1946: 150) regards them as directly ancestral to the birds that today inhabit our western marshes.